
100th Anniversary of
Chula Engineering 2013

Seletion

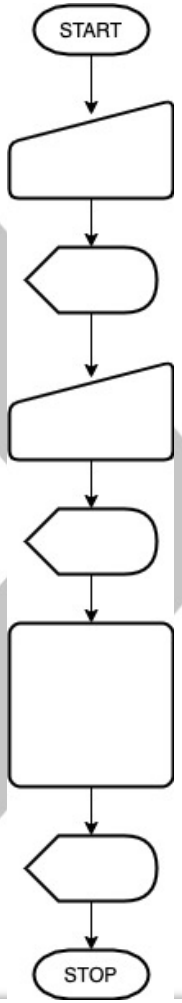

python
powered

Topics

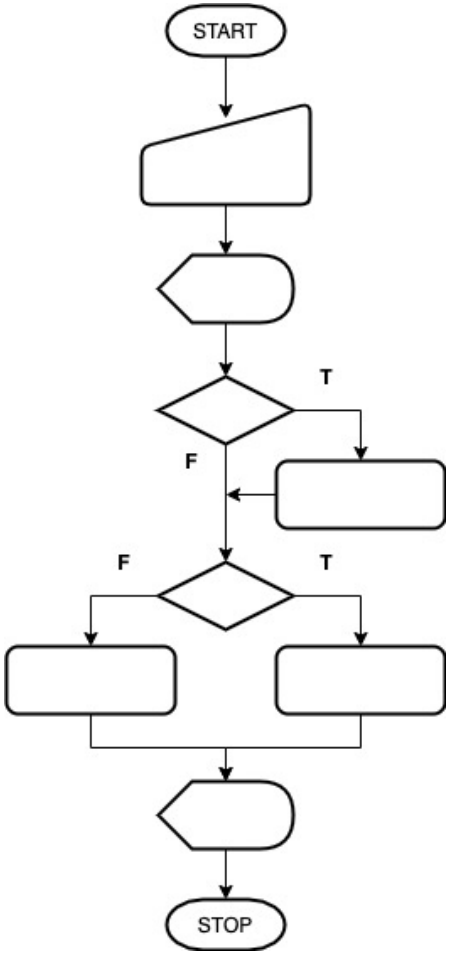
- Flowchart
- `if – else`
- Boolean expression
- List/String comparison
- `a in b`
- `if`
- `if – elif – else`

Flowchart

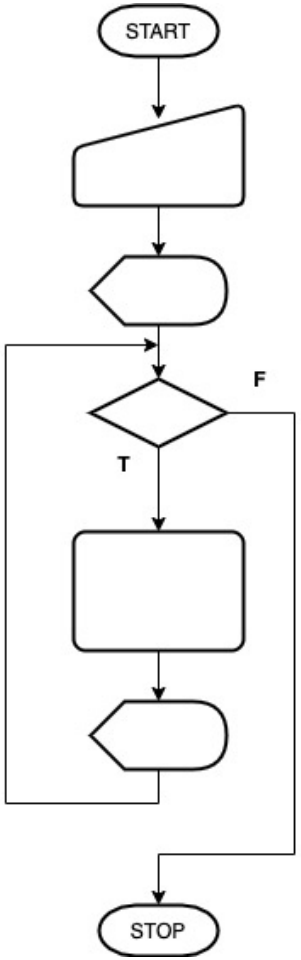
Sequential



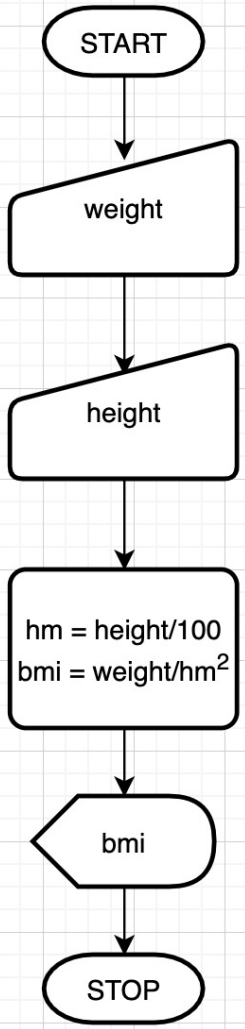
Selection



Repetition



Flowchart : show steps



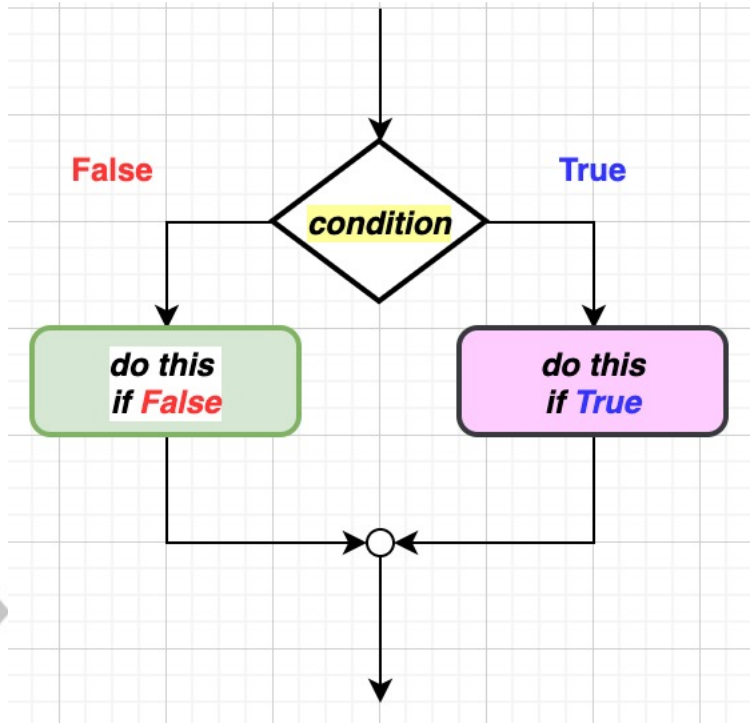
get inputs from keyboard

```
weight = float(input())

height = float(input())

hm = height / 100
bmi = weight / (hm**2)

print(bmi)
```

show result on screen

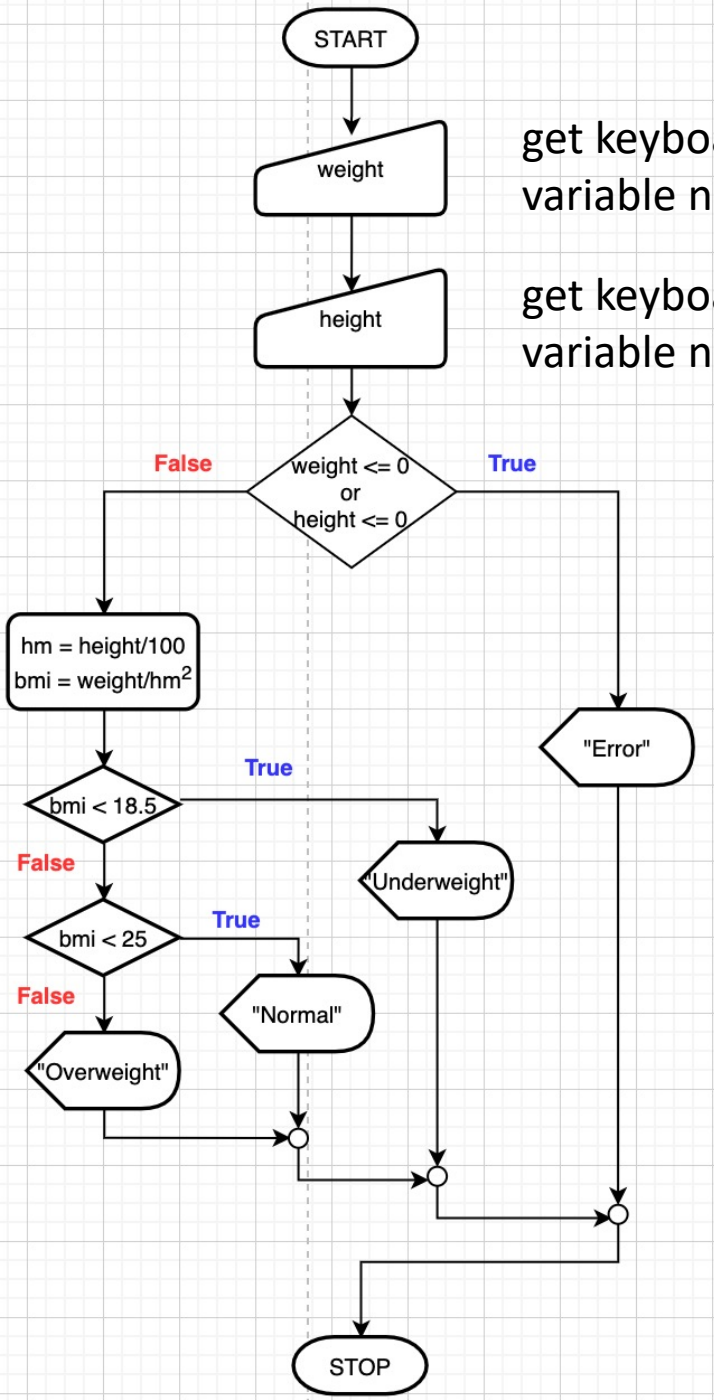
flowchart → program

Flowchart and statement : if - else




```
if condition :
    do this if True
else
    do this if False
```

Example flowchart



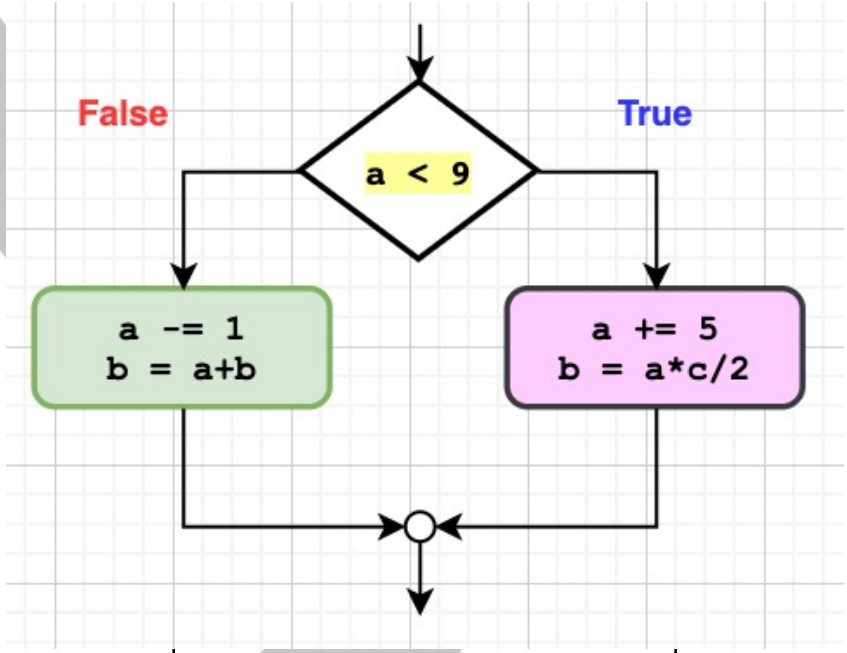
get keyboard input into variable named `weight`

get keyboard input into variable named `height`

What would be the condition for
- overweight,
- underweight,
- or normal

show error message

if – else statement




```
if a < 9 :
    a += 5
    b = a * c / 2
else :
    a -= 1
    b = a + b
```

must have : (colon)

statements in block must have same indent

```
if a < 9 :
    a += 5
  b = a * c / 2
else :
    a -= 1
    b = a + b
```

incorrect indent

```
if a < 9 :
    a += 5
    b = a * c / 2
else :
    a -= 1
    b = a + b
```

if and else could have different indent

Boolean expression

- Evaluated to True or False
- Use operator < > <= >= != == for comparison
- Use and or to combine multiple comparisons
- Use not to toggle the result True -> False, False -> True
- If there are and, or, not; not will be evaluate first then and, then or

```
if m == 4 or m == 6 or m == 9 or m == 11:
    print('has 30 days')
```

```
if not(m == 2 or m == 4 or \
       m == 6 or m == 9 or m == 11) :
    print('has 31 days')
```

```
if m != 2 and m != 4 and \
   m != 6 and m != 9 and m != 11 :
    print('has 31 days')
```

Example


```
if x % 2 == 0 : # if x is even number
```

```
if 1 <= m <= 12: # if m is between 1 to 12 inclusively
```

```
if y % 400 == 0: # if y is divisible by 400
```

```
if student_id[-2:] == "21": # if it is an Engineering student
```

```
if tel_no[:2]=="02": # if telephone number is in Bangkok
```

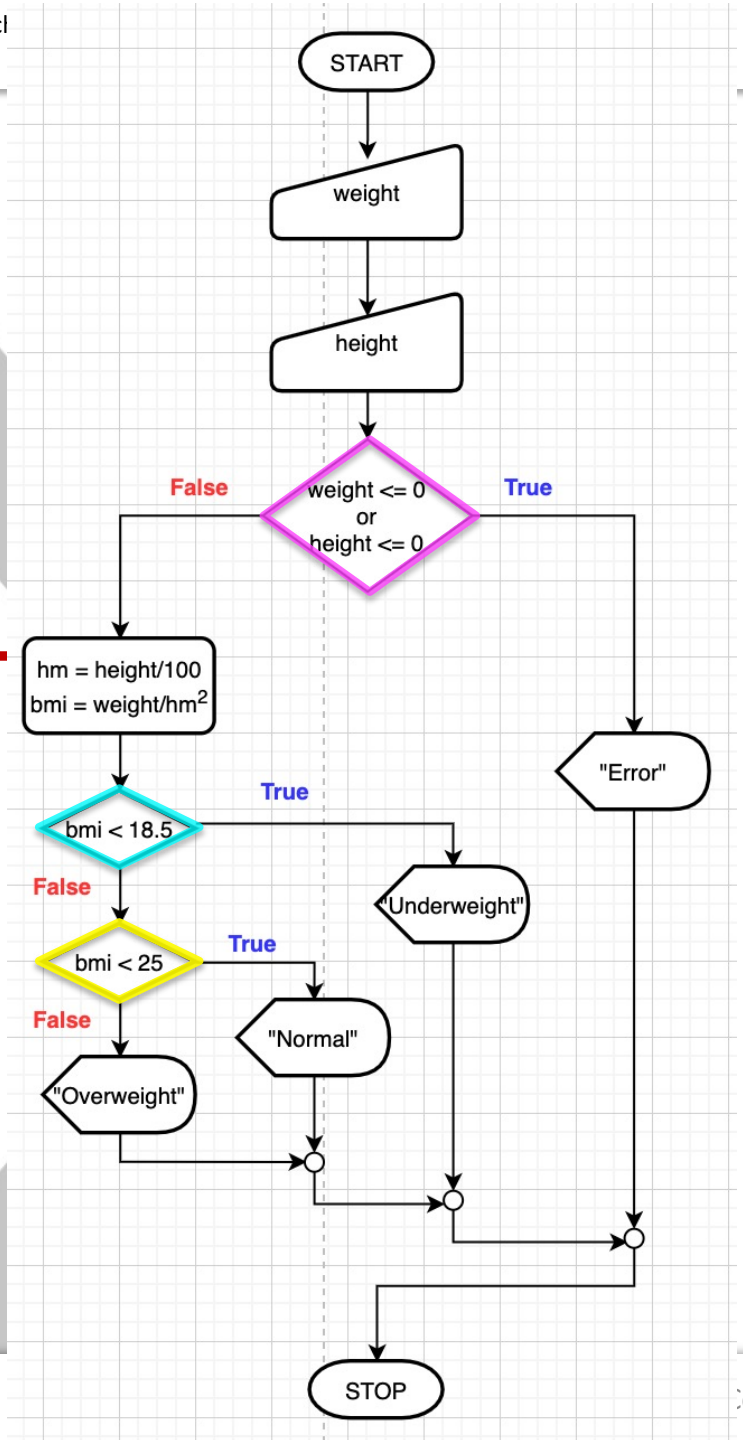
Exercise: Mobile phone number


```
tel_no = input()


if

    print('Mobile number')
else:
    print('Not a mobile number')
```

tel_no is a mobile phone number if it
- has 10 digits and
- begins with 06, 08, 09

(assume that all other digits are numbers)

Example




```
weight = float(input())

height = float(input())

if weight <= 0 or \
   height <= 0 :
   print('Error')
else :
   hm = height / 100
   bmi = weight / hm**2
   if bmi < 18.5 :
      print("Underweight")
   else :
      if bmi < 25 :
         print("Normal")
      else :
         print("Overweight")
```

List comparison

- compare from left to right

```
[10, 2] > [9, 9, 9]    is true
[10, 2] > [10, 1, 9]   is true
[10, 2] > [10]         is true
[10]    > []           is true
```

String comparison

- lowercase is greater than UPPERCASE
- alphabets have increasing value from 'A' to 'Z'
  - `'A' < 'Z'` is **`True`**
  - `'A' < 'B' < 'Z' < 'a' < 'b' < 'z'` is **`True`**
- digits have increasing value from '0' to '9'
  - `'0' < '1' < '2' < '3' < '4' < '9'` is **`True`**

- string comparison is alphabetically from left to right
  - `'ABC' < 'aA'` is **`True`**
  - `'ABC' < 'ACAA'` is **`True`**
  - `'ABC' < 'ABCC'` is **`True`**
  - `'100' < '19'` is **`True`**

Example

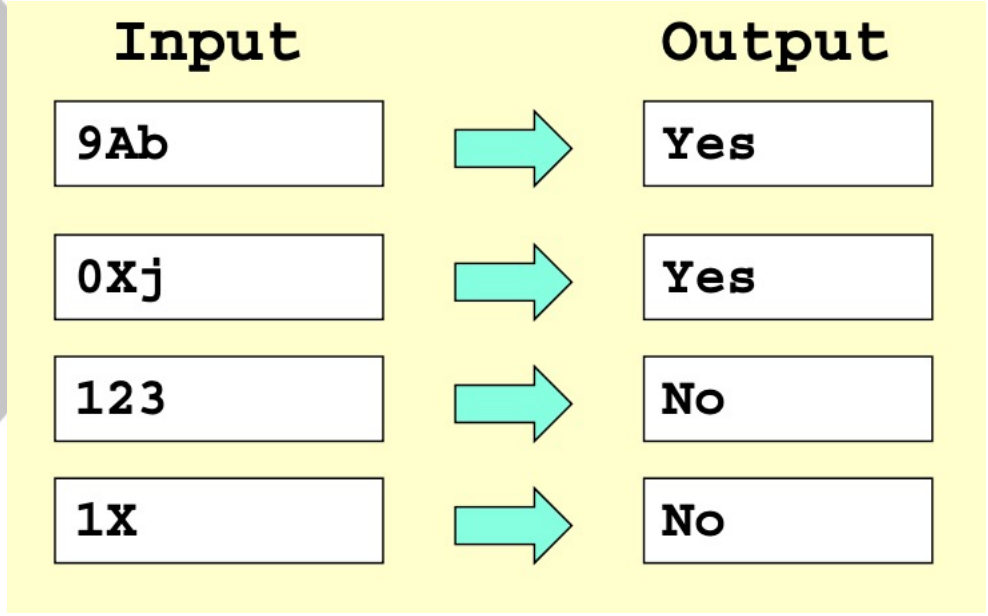
```
# if x is digit
if "0" <= x and x <= "9" :

if "0" <= x <= "9" :
```

```
if 'a' <= x <= 'z' or \
   'A' <= x <= 'Z': # if x is English alphabet
```

```
# if born after 30 September 1997, birth_date = [y, m, d]
if birth_date > [1997, 9, 30] :
```

Exercise: Digit_Upper_Lower

Write a program that takes three alphabets and check that if the first, middle, and last are digit, uppercase, and lowercase respectively



if a in b :

- if a and b are strings
  - `a in b` evaluates that a is a substring of b or not
  - `'python' in 'I love python'` → **`True`**
  - `'Python' in 'I love python'` → **`False`**
- if b is a list
  - `a in b` evaluates that a is an element in b or not
  - `6 in [2, 4, 6, 8, 10]` → **`True`**
  - `'Python' in ['Java', 'Python', 'Swift']` → **`True`**
  - `'python' in ['Java', 'Python', 'Swift']` → **`False`**
  - `'a' in ['Java', 'Python', 'Swift']` → **`False`**

- `if not (a in b) :` `# if a is not in b`
- `if a not in b :` `# if a is not in b`

Example

```
# let x be a string that has one alphabet
# test that x is a vowel

if x == 'a' or x == 'e' or x == 'i' or \
   x == 'o' or x == 'u' or x == 'A' or \
   x == 'E' or x == 'I' or x == 'O' or x == 'U' :

if x in 'aeiouAEIOU' :

if x in ['a', 'e', 'i', 'o', 'u',
         'A', 'E', 'I', 'O', 'U']:

if x in 'aeiouAEIOU'.split('') :

if x.lower() in ['a', 'e', 'i', 'o', 'u'] :
```

too long

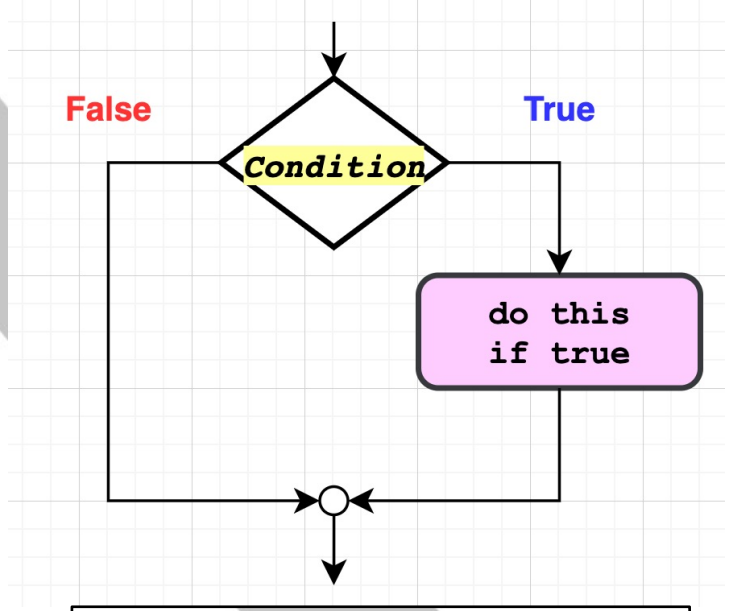
if x is 'ei', this also yields True

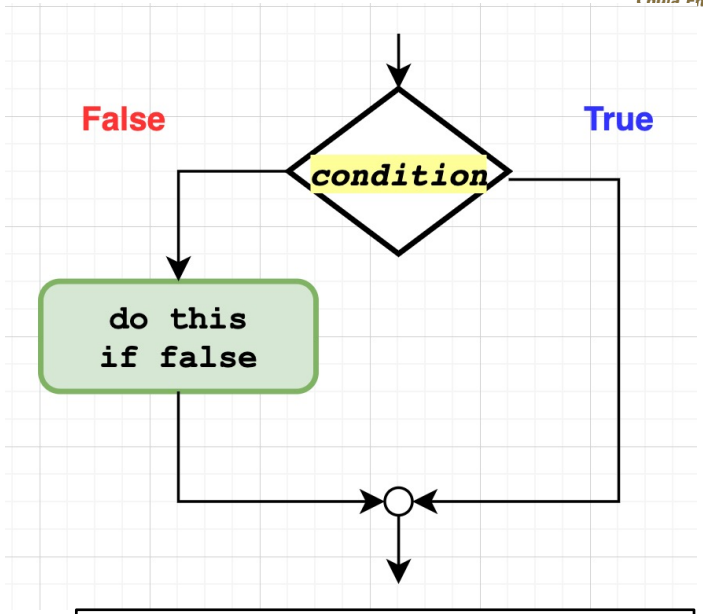
Exercise

21	FACULTY OF ENGINEERING
22	FACULTY OF ARTS
23	FACULTY OF SCIENCE
24	FACULTY OF POLITICAL SCIENCE
25	FACULTY OF ARCHITECTURE
26	FACULTY OF COMMERCE AND ACCOUNTANCY
27	FACULTY OF EDUCATION
28	FACULTY OF COMMUNICATION ARTS
29	FACULTY OF ECONOMICS
30	FACULTY OF MEDICINE
31	FACULTY OF VETERINARY SCIENCE
32	FACULTY OF DENTISTRY
33	FACULTY OF PHARMACEUTICAL SCIENCES
34	FACULTY OF LAW
35	FACULTY OF FINE AND APPLIED ARTS
36	FACULTY OF NURSING
37	FACULTY OF ALLIED HEALTH SCIENCES
38	FACULTY OF PSYCHOLOGY
39	FACULTY OF SPORTS SCIENCE
40	SCHOOL OF AGRICULTURAL RESOURCES

What is the student's faculty, from a given student ID?

When False do nothing/True do nothing






```
if condition :
    do this if true
else:
    pass
```

```
if condition :
    pass
else:
    do this if false
```

```
if condition :
    do this if true
```

```
if not condition :
    do this if false
```

pass is a statement that do nothing

Example: Days in year

- Let y stores year number

  February has 29 days if

  - y is divisible by 400 or
  - y is divisible by 4 but not divisible by 100
  - i.e., 2004, 2000, 2020

```
y = int(input())
days_in_year = 365

if (y % 400 == 0) or \
   (y % 4 == 0 and y % 100 != 0):
   days_in_year = 366

print(days_in_year)
```

Example: Buy 2 get 1 free


```
p1 = float(input())
p2 = float(input())
p3 = float(input())

min_p = p1
if p2 < min_p:
    min_p = p2
if p3 < min_p:
    min_p = p3

total_price = p1 + p2 + p3
print('Total:', total_price)
print('Got one free:', min_p)
print('Pay only:', total_price – min_p)
```

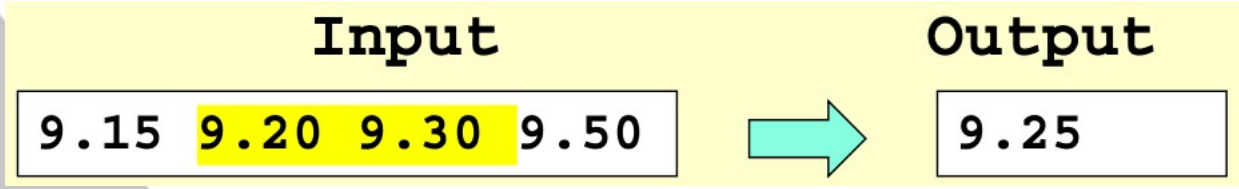
get inputs

find minimum price

show results

Exercise: Gymnastic scores

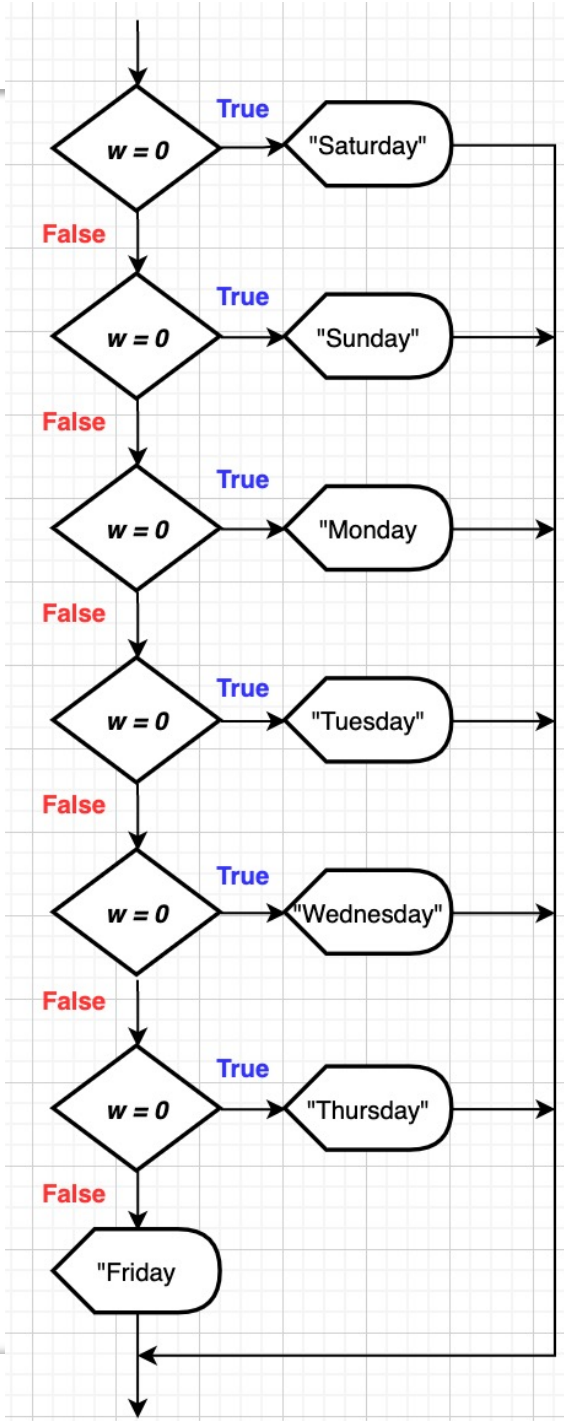
Scores from 4 judges, remove highest and lowest scores, then calculate the average of remaining scores




```
x = input().split()
s1 = float(x[0])
s2 = float(x[1])
s3 = float(x[2])
s4 = float(x[3])
```

if – else – if – else
→ if – elif – else

```
if w == '0':
  print('Saturday')
else:
  if w == '1':
    print('Sunday')
  else:
    if w == '2':
      print('Monday')
    else:
      if w == '3':
        print('Tuesday')
      else:
        if w == '4':
          print('Wednesday')
        else:
          if w == '5'):
            print('Thursday'):
          else:
            print('Friday')
```

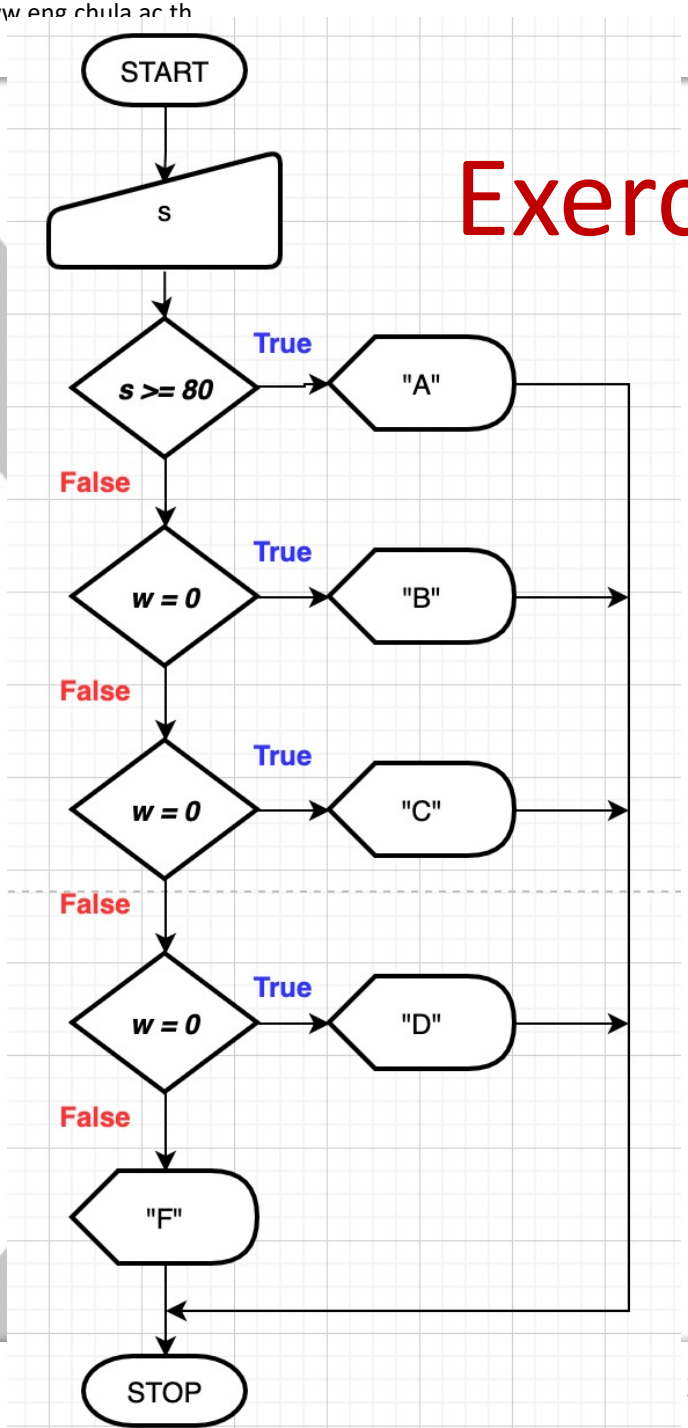


if – else – if – else → if – elif – else


```
if w == '0':
  print('Saturday')
else:
  if w == '1':
    print('Sunday')
  else:
    if w == '2':
      print('Monday')
    else:
      if w == '3':
        print('Tuesday')
      else:
        if w == '4':
          print('Wednesday')
        else:
          if w == '5'):
            print('Thursday'):
          else:
            print('Friday')
```

```
if w == '0':
  print('Saturday')

elif w == '1':
  print('Sunday')

elif w == '2':
  print('Monday')

elif w == '3':
  print('Tuesday')

elif w == '4':
  print('Wednesday')

elif w == '5'):
  print('Thursday'):
else:
  print('Friday')
```

Exercise: find the grade




```
s = float(input())
```